NAVAL WAR COLLEGE
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Is a fundamental revolution in military medicine required to support Joint Vision 2010 and the Joint Forces Commander in the 21st century?

by
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A paper submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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The twentieth century has seen dramatic changes in the art of war. In the past, the development of the tank, the introduction of the air arm and the rise in the supremacy of the aircraft carrier changed the nature of military planning and engagement. Today, the advent of new forms of communications and imaging technology, incorporated into battlefield networks have led to a rethinking of strategy conceptualization and has spawned great debate over the *Revolution in Military Affairs*.

In drafting Joint Vision 2010 (JV 2010), the former Chairman of the Joint Chiefs of Staff, General J.M. Shalikashvili, envisioned a revolutionary bridge to the uncertain and challenging future through--channeling the vitality of our people and leverage technological opportunities to achieve new levels of effectiveness in joint warfighting...achieving dominance across a range of military operations...the application of new operational concepts...within a joint framework of doctrine and programs.

What does JV 2010 mean to military medicine? How will the military medical department leverage technology, doctrine and training programs in the new millennium? Can technology alone get us there or is technology simply the fulcrum on which we springboard forward? This paper will focus on the evolution of military medicine toward JV 2010 and will assess the relative importance of emerging technology, doctrine, and training in order to support the Joint Force Commander in the 21st century.

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Abstract of -

Is a fundamental revolution in military medicine required to support Joint Vision 2010 and the Joint Forces Commander in the 21st century?

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Introduction

> "Joint Vision 2010 (JV 2010) is the conceptual template for how we will channel the vitality of our people and leverage technological opportunities to achieve new levels of effectiveness in joint warfighting. Focused on achieving dominance across a range of military operations through the application of new operational concepts, this template provides a common direction for our services in developing their unique capabilities within a joint framework of doctrine and programs as they prepare to meet the uncertain and challenging future."[1]
>
> ----- John M. Shalikashvili

Direct combat action against an enemy is the armed forces most demanding requirement, however, humanitarian assistance in peacetime through peace operations in a near hostile environment are highly probable and nearly as difficult. Instead of relying on massed forces and sequential operations, the United States must will achieve massed affects--the necessary concentration of combat power at the decisive time and place-- in other ways with less need to mass forces physically than in the past. Joint Vision 2010 states that this will be accomplished by utilizing--dominant maneuver; precision engagement; full dimensional protection; and focused logistics.[2]

JV 2010 identifies the following as requirements to transform the operational concepts into joint capabilities: people, leadership, doctrine, education and training, organizational structure, and material. Any analysis of the capabilities needed to achieve the mission must evaluate the projected operating environment. JV 2010 also describes the operating environment for US armed forces as:

- a joint force--persuasive in peace, decisive in war, preeminent in any form of conflict
- to deter conflict--but, should deterrence fail, to fight and win our nations wars

[1] Shalikashvili, JM, *Joint Vision 2010*, p.1.
[2] *Joint Vision 2010*, p. 17-18.

- power projection, enabled by overseas presence, will likely remain the fundamental strategic concept of our future
- will involve multinational coalitions, CONUS based and rapid strategic mobility to enable a timely response.[3]

In order to implement the Joint Vision in the 21st century environment, many scholars contend that realistic and stressful training with technologically superior equipment is critical the successful implementation of this vision and the ultimate success of our forces in combat. This thinking has lead to a call for a Revolution in military affairs.

Conventional wisdom may be that the United States is on the verge of a military revolution. But to constitute more than just a cliche' the component parts and the implications of a revolution in military affairs must be clearly understood. What constitutes a revolution in military affairs? Bates Gill and Lonnie Henley of the US Army's Strategic Studies Institute at Carlisle Barracks are acknowledged experts in the study of RMA's. They conclude that an RMA would have the following characteristics: [4]

- RMA's are not simply technological in nature, but concern significant progress and change in: technology, doctrine, and organizational training;
- changes or progress in these areas in and of themselves do not represent a true RMA, but rather it is the *synergistic combination* of these developments which form the true RMA *and alters the nature of warfare*;
- RMA's emerge from revolutionary changes of historic magnitude within broader social, economic, and political environments of national and global societies, which in turn offer the condition for RMA's to be recognized, appreciated, internalized, and exploited.

The Department of defense (DOD) Medical Readiness Vision states, "The military medical department exists to support their combat forces in war and peacetime, to maintain and sustain the well being of the fighting forces in preparation for war. The

[3] Joint Vision 2010, p.5.

military medical department must be prepared to respond effectively and rapidly to the entire spectrum of potential military operations--from major theater wars to military operations other than war (MOOTW)."[5]

Military medicine in the 21st century will be challenged to support highly mobile, widely dispersed, joint (and multinational) forces during information-intensive operations in unstable, complex and dangerous environments. As post-Cold war strategies, doctrine, and capabilities continue to evolve, medical systems are likely to be recognized and eventually institutionalized as strategic imperatives.[6]

THESIS

This paper seeks to argue that advances in medical technology provide exponential benefits in support to the warfighter, but technology is not a panacea. Current military medical plans developed to support JV 2010 are evolutionary rather than revolutionary. I will illustrate that the full affects of emerging medical technology cannot be realized without institutionalized doctrine that supports personnel proficiently in order to exploit the capabilities of technology.

EMERGING MEDICAL TECHNOLOGIES

To meet the medical challenges of the new national security strategy (rapid deployment and highly mobile forces), the Joint Staff has directed military medical

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[4] Bares Gill and Lonnie Hendley, *China and the Revolution in Military Affairs*, Carlisle Barracks: Strategic Studies Institute, US Army War College, May, 1996.

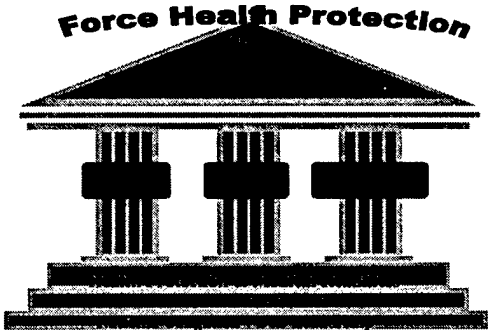
[5] Department of Defense Directive 5136.1-P August 1998, *Department of Defense Medical Readiness Strategic Plan (1998-2004)*. March 1995, p. 63.

[6] Military Health Service Support, Joint Staff (J-4 MRD), Pentagon, Washington, DC.

departments to leverage information technology (IT) for the benefit of the patient, the provider, the Military Health System (MHS), and the warfighter.[7] The capability to care for patients, track risk/exposures, and quantify the delivery of medical interventions across a continuum of care is a daunting task.

The Chairman of the Joint Chiefs of Staff (CJCS) presented a conceptual framework for joint military operations in the 21st century in JV 2010, which also mandates the development and application of advanced technologies to support a variety of missions in unpredictable and unstable environments. The MHS white papers response to JV 2010, Joint Health Service Support 2010--Full Spectrum Health, sets forth the strategy for implementing the three pillars of FHP.[8]

Figure 1



The tasks of developing and evaluating concepts of operational health service support for the 21st century provide significant challenges for medical planners. The medical missions of locating, protecting, diagnosing, treating and evacuating patients from the battlefield will undoubtedly continue in the future. To this end, the military medical community's focus is first and foremost on bringing hi-tech medical capabilities

[7] Birch and Davis Associates, *An Analytical Strategy For Planning Force Health Protection Implementation*, November 25, 1998, p. I-3.
[8] Ibid.

to the battlefield

Rear Admiral Michael L. Cowan, MD is the Joint Staff's deputy director for medical readiness and oversees the development of emerging technologies. He advocates initiatives that will aid in medical intervention at the point of injury. RADM Cowan has contracted for the research and development of powdered blood, helmet mounted video capability and air dropped environmental surveillance capabilities.[9]

A medic or soldier with water can reconstitute the powdered blood that weighs less than two ounces. Researchers are also developing a means to fit medics with helmets that include video cameras to transmit images to specialist aboard ship or in CONUS for treatment consultation. RADM Cowan has advocated the development of mobile medical surveillance equipment to determine what hazards are prevalent in a particular combat zone. RADM Cowan stated, "...this is required to prevent another crisis like the one the Pentagon endured during the Gulf War, from which thousands of soldiers came home complaining of illnesses collectively dubbed Gulf war Illness."[10]

Another demonstration of emerging medical technologies is the Marine Corps Combat Development Command's (MCCDC) Experiment Sea Dragon. Sea Dragon is a compilation of new ideas or concepts detailing how Naval Expeditionary Forces will fight in the 21st Century. Sea Dragon began in the early 1990's when MCCDC planners began looking at the post cold war world and examining the characteristics of possible future conflicts. These characteristics included increasing technology, increasingly lethal weapons, and a propensity for conflict along the littoral or land-water interfaces of the world.

Sea Dragon operational concepts were predicated on the employment of small squads inserted into the battlefield from over the horizon and operating independently across a larger area than on a conventional battlefield. With fewer forces ashore to provide security, combat service support elements (including medical) normally employed ashore, will remain aboard ship. The overall objectives of Sea Dragon was to reduce force exposure to risk, apply forces more precisely, and reduce collateral damage in addressing future threats. The Sea Dragon Concept was exercised during Amphibious Warfighting Experiment Hunter Warrior at the Marine Corps Air ground Combat Center in 29 Palms, CA. The concepts validation exercise included Health Service Support and was CSS Enterprise.

The CSS Enterprise mission was to develop and evaluate new concepts and technologies for combat service support. The name CSS Enterprise was coined to connote both the futuristic outlook of Star Trek and the efficiency motive of private enterprise in developing future combat service support systems. Some specific Health Service Support projects include video-assisted treatment, automated treatment entry and dedicated medical communications systems.

Training is particularly important in the practice of battlefield patient assessment and triage where time is of the essence in saving life and limb. Sea Dragon also evaluated the Medical Readiness Learning Initiative or MERLIN sponsored by the Office of the Assistant Secretary of Defense for Health Affairs. MERLIN is a computer-based interactive video-training program, which assists medics in triage and casualty management skills. Without the conventional medical logistics supply network ashore an

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[9] Bowmwn T, *Military Prepares for the Battlefield of the Future*, Baltimore Sun. November 23, 1998.

alternate method of resupply is necessary. CSS Enterprise developed a Rapid Request Tracking System or RRTS for resupply to the field. Class VIII resupply through this system is being tested.

Communications capacities being developed for Amphibious Task Forces can be advantageous in health service support. The Newton Ericsson Communications System was developed to support Sea Dragon scenarios in order transmit supply and patient movement requests. The system uses off the shelf hardware, including the Apple Newton touch screen computer and Ericsson radio. The system includes screens for medevac requests and rapid requests for medical supplies. In conjunction with the Naval Health Science Research Center the Multi-Technology Automated Reader Card (MARC) was similarly evaluated as a means of bar coded treatment entry and archiving of critical information.[11]

Can this impressive array of *Buck Rodgers gear* meet the requirements of JV 2010, or is it just expensive and heavy gear for the medic to hump around? I contend that in order to realize its capability, the gear must be coupled with medics who are skilled in the understanding and application of these technologies.

JOINT MEDICAL DOCTRINE

Future Joint Health Service Support (HSS) doctrine will be based on force health protection (FHP). FHP concepts are based on key ideas advanced in JV 2010 and adapts those same ideas to the healthcare setting, creating a military health system that invasions

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[10] Ibid.

[11] Kiobasa L A, Eby ME, *CSS Enterprise/Sea Dragon: developing operational health service support concepts for the 21st century*. MSC professional bulletin. December 1996.

dominant medical maneuver, precision health engagement, full spectrum protection for *the human weapons system*, and focused medical logistics to support the force.[12]

The Joint Staff views the HSS mission in joint operations as protecting the health of the force by ensuring that the Joint Force Commander (JFC) has hyper-fit forces that are protected from disease and injuries, and receive the best possible casualty care when wounded. This is achieved by a phased health care delivery system that extends from actions taken prior to deployment via health promotion and immunizations, during deployment via medical surveillance and environmental monitoring, to combat casualty care from the point of wounding/injury/illness to evacuation from a theater for treatment at a hospital in the continental United States (CONUS). The primary objective of HSS is to protect and preserve the commander's fighting strength of land, sea, air, and special operations forces (SOF). HSS in joint operations requires continuous planning, coordination, and training to ensure a prompt, effective, and unified health care effort.[13] The medical readiness division of the Joint Staff (J-4 MRD) plans to develop doctrine that will facilitate the implementation of this concept and has recently formed a working group, consisting of subject matter experts from the Army, Navy, Air Force, and Marines, to accomplish that task. For the purposes of this paper, the Military Health System (MHS) goals defined in Joint Health Service Support (JHSS) 2010--full spectrum health, are the three pillars of Force Health Protection (FHP) as depicted in Figure 1. The three pillars, which are expected to be fully implemented within the timeframe of JV 2010, provide the conceptual framework for FHP.[14]

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[12] Joint Staff (J-4 MRD), Capstone (DRAFT), 10 June 1998, p. I-2.
[13] Joint Pub 4.02 (DRAFT), p.1.
[14] *Joint Health Service Support 2010/Force Medical Protection*, Medical Information

The MRD stated in its preface to the its draft Joint Pub 4-02 the need for current and applicable doctrine that adheres to and keeps pace with the changing global environment.

> "Changes in our national and international security environment, advances in technology, and reduction in American military force structure require a fresh consideration of the role of the military health system (MHS) and the provision of healthcare throughout the spectrum of conflict...we must accommodate the real world constraints of decreasing budgets and related reductions in manpower, while simultaneously refining our capabilities through innovative tactics, techniques and procedures."[15]
>
> -- J-4 MRD

In response to this tasking, the working group also canvassed medical planners from the Assistant Secretary of Defense for Health Affairs ((OSD (HA)), the services, CINC's and component staffs, in order to assess the critical factors requiring improvement within the military health system. The information in appendix A reflects the result of the workgroup's questionnaire and it specifically contains the top ten priorities of the quorum. It is my contention that the workgroup missed the mark. The findings are almost singularly focused on leveraging technology and evidence little need for enhanced doctrine or training.

TRAINING

In the future, highly skilled military personnel will deploy globally from CONUS with little notice. The impact of proper training should not be minimized. The quality of HSS and the individual medic's training create the fulcrum on which technology enhances battlefield capability. It will be imperative that all individuals be trained in the

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Management/Information Technology Conference, Draft Report, United States Army, Navy, Air Force, Coast Guard, and SRA International, March 1998, pp. 1-1, 1-2.

importance of readiness and the prevention of illness and injury throughout all phases of the deployment. The health services support structure must be organized to assist commanders with this training and preparation of the force.

The MRD also contends that soldiers, sailors, airman and marines are the most valuable and complex weapon systems the US military will ever field. These human weapon systems require life-cycle maintenance just as other less complex weapon systems do. Maintenance, through training, will involve enhanced methods of preventing casualties, application of appropriate intervention skills and improved service coordination--during and after military operations.[16]

During peacetime, surgical teams stationed at military installations are not treating trauma patients in the breath a depth of a combat environment. To compensate for this, initiatives are in place for military surgeons to train at metropolitan treatment facilities where victims of urban violence, car crashes and industrial accidents present with combat like wounds. Over 150 surgeons from the Army, Navy, and Air Force meet in April of 1998 at the Maryland Shock trauma Center in Baltimore to plan for the changing nature of military medicine. The intent of the conference was to develop training cycles to bridge the gap between routine surgeries they do daily and the extraordinary demands that they might face in combat.[17]

A 1995 Congressional Budget Office report concluded that less than 5 percent of cases treated by military medical personnel correlate to combat injuries while 98 percent of the cases at civilian trauma centers match battlefield injuries. Although the trauma

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[15] Executive Summery and Commanders Overview, Joint Pub 4-02 (draft)
[16] J-4, MRD, Capstone, p. I-3.
[17] Sugg DK, *Military Surgeons Get Trauma Lessons*. Baltimore Sun. 17 April 1998.

center in Baltimore has trained small numbers of military personnel, the center has offered to expand the program focussing on trauma teams that might quickly deploy.

In order to counter this phenomenon, MRD plans to develop a partnership with civilian trauma centers to provide trauma training of military personnel in civilian treatment facilities.[18] However, the program's limited scale and lack of institutionalized approach is an insufficient Band-Aid for the greater dilemma of inadequate trauma training.

An example of innovative training in response to urban environments and CONUS requirements is US Atlantic Command's (USACOM) Exercise Purple Challenge, coordinated by CDR Timothy E. Tyre, MSC, USNR.

Purple Challenge was Wisconsin's largest mass casualty response exercise in a joint civilian/military operational format, which took place on the 2nd and 3rd of May, 1998. This civilian/military exercise simulated a terrorist bombing of the city hall building in the Milwaukee suburb of New Berlin and resulted in a coherent civilian and military team effort. Civilian emergency medical personnel, fire fighters and law enforcement totaled in excess of 200 representing county, state, and federal emergency government personnel. Over 200 military personnel from the Naval Reserve, Wisconsin Army National Guard, and Wisconsin Air National Guard exercised side by side with special weapons and tactics (SWAT) teams, fire fighters, bomb disposal units, and state emergency management personnel.

Exercise Purple Challenge provided disaster response training and urban conflict exposure for members of: the Naval Reserve Hospital Great Lakes DET; elements of

Naval Reserve Fleet Hospital detachments from both Green Bay and Madison, Wisconsin; and selected reservists (SELRES) from the Naval and Marine Corps Center in Milwaukee, Wisconsin. The exercise presented a unique opportunity for the Naval Reserve Unit whose cohesiveness and display of professionalism affectivity prepared medical personnel for MOOTW.[19]

Although these training examples represent a fundamental reorientation of military medical forces--away from acute-care services--that emphasize post casualty intervention and toward proactive and proficient medical services prepared for the urban combat environment, they must be implemented in greater scale across the services in order to effectively provide an adequate the level of proficiency.

CONCLUSIONS

The debate over the "Revolution in Military Affairs" lies at the heart of military planning, especially in the light of the continued costs of equipment and the tendency of the United States to cut back on defense spending.

The initiatives outlined in this paper do not appear to alter the nature of warfare nor do they create changes of historic magnitude within broader social, economic, and political environments on a national scale. The implementation of FHP and MHSS 2010 constitute an evolutionary response to a changing environment. DOD measures to tailor HSS to the warfighter are leaps and bounds for more progressive than the current institutionalized treatment on the battle field, but do not meet the requirements for an

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[18] Ibid.

[19] Tyre TE, "Exercise Purple Challenge". Navy Medicine. September-October 1997.

RMA.

The Joint Staff's medical reengineering workgroup's assessment of critical factors affecting the implementation of MHSS 2010 is overwhelmingly focused on technology. The top 10 priorities do not indicate the proportional need for a full range of doctrinal and training competencies required of MHS in order to support the JFC in the 21st century. I submit that the MHS is undergoing evolutionary changes to adapt to the projected operating environment of JV 2010.

I would caution planners and leaders against viewing emerging technologies as a panacea or a cure all for any contingency. While struggling with the revolutionary phenomenon of information technology, leaders and planners are easily distracted by the speed and simplicity of information. Information systems and technological innovations have limitations and need to be kept in perspective. If the military medical system is to successfully support JV 2010, its dependency on technological advances must be balanced with appropriate training and sound doctrine. The Commander of the US Pacific Command, ADM J.W. Prueher, shares this need for balance. ADM Prueher, has stated that, " although the US military embraces information systems and technology is important...and though rapid processing of data and information can speed up decision cycles, technology is no substitute for knowledge and understanding."[20]

[20] Prueher JW, *Information Age Overload: more data does not mean superior judgement.* Defense News. December 1998.

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APPENDIX A: CRITICAL FACTORS

1	*H&F Force*	**Occupational and environmental health**
		⇒ ID, evaluate and control potential chemical biological and physical hazards
		⇒ Monitor uncontrolled exposures
		⇒ Train commanders and members to identify and respond to hazard risks
		⇒ Develop improved monitoring technology to assess exposure levels
		⇒ Continue developing geographic and individual exposure monitoring system
		⇒ Monitor unit/individual response to risk via outcomes from exposures
2	*Casualty Prevention*	**Standardize technology/equipment/structure for real-time analysis and threat confirmation**
3	*En Route Care*	**Develop reliable seamless communications(voice and data) supporting the evacuation system**
4	*H&F Force*	**Injury/Disease Prevention. Goal: in prevalence / incidence.**
		• Identify preventable injuries and disease affecting mission readiness
		• Establish standards for occurrence rates and acceptable behaviors
		• Develop prevention strategies
		• Implement clinic preventive services
		• Provide injury rehab and mobile fitness facilities on deployments
5	*Surveillance*	**Develop a joint comprehensive standard Health surveillance system (DMSS)**
		• Environmental / Occupational Capability
		• DNBI Capability
		• Operational Casualties Capability
		• Linkages to personnel exposure (location, duration information)
		• Seamless garrison/field capability
		• Health assessments and serum collection
		• Command and community climate
6	*IM/IT*	**Design, develop, and implement an integrated medical C4I infrastructure across the operational continuum for medical IM infrastructure**
		• Develop joint C4I SR medical doctrine and policy

		• Develop medical IM/IT requirements and capacity planning process
		• Design plan for networks, connectivity, and end-user device placement for medical operational platforms
		• Identify priorities for funding and sustainment with DHP and service PPBES process
		• Provide Personal Information Carrier - with basic capability
		• Identify and provide system and network administration support in operational end-strength
7	*1st Responder*	**Standardize joint combat medic/corpsmen core competencies**
8	*Forward Surgery*	**Develop joint medical doctrine/standards for Forward Resuscitative Surgery**
		• Patient viability
		• Resuscitative surgeries
		• Define staged surgery
		• Define evacuation stability criteria
		• Post op/pre op evac care
		• Role of telemedicine
		• Host unit support of FRS
		• FRS team composition and employment
		• Validation through exercise
9	*Theater Hospital (TH)*	**Develop joint doctrine for TH operations**
		• Develop service specific operational concept of employment
		• Joint C3I for theater hospital
		Program for acquisition (POM)
10	*Logistics*	**Continue Development of the DMLSS readiness capability, incl. Retail, wholesale, and operational level**
USMC	*Training*	**Develop training programs to enhance a healthy and fit force**
SCSG	*R &D*	• Develop small detection device for environmental toxins, pathogens, vectors

APPENDIX B: ABBREVIATIONS AND ACRONYMS

CINC	Commander in Chief
CJCS	Chairman of the Joint Chiefs of Staff
CONUS	Continental United States
FHP	Force Health Protection
HA	Humanitarian assistance
H & F FORCE	Healthy and Fit Fighting Force
HN	Host Nation
HNS	Host-Nation Support
HSS	Health Service Support
J4	Logistics Directorate
JFC	Joint Force Commander
JHSS	Joint Health Service Support
JTF	Joint Task Force
MHS	Military Health System
MOOTW	Military Operations Other Than War
MTF	Medical treatment facility
US	United States
USACOM	United States Atlantic Command
USPACOM	United States Pacific Command

APPENDIX C: TERMS AND DEFINITIONS

Casualty. Any person who is lost to the organization by having been declared dead, duty status-whereabouts unknown, missing, ill, or injured. (Joint Pub 1-02)

Combatant command. A unified or specified command with a broad continuing mission under a single commander established and so designated by the President, through the Secretary of Defense and with the advice and assistance of the Chairman of the Joint Chiefs of Staff. Combatant commands typically have geographic or functional responsibilities. (Joint Pub 1-02)

Combat service support. The essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Within the national and theater logistic systems, it includes but is not limited to the support rendered by service forces in ensuring the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. Combat service support encompasses those activities at all levels of war that produce sustainment to all operating forces on the battlefield. (Joint Pub 1-02)

Health Service Support. All services performed, provided, or arranged by the Services to promote, improve, conserve, or restore the mental or physical well-being of personnel. These services include, but are not limited to: the management of health services resources, such as manpower, monies, and facilities; preventive and curative health measures; evacuation of the wounded, injured, or sick; selection of the medically fit and disposition of the medically unfit; blood management; medical supply, equipment, and maintenance thereof; combat stress control; and medical, dental, veterinary, laboratory, optometry, medical food, and medical intelligence services. (Approved for inclusion in the next edition of Joint Pub 1-02) Also called HSS. (Joint Pub 1-02)

Host-Nation Support. Civil and/or military assistance rendered by a nation to foreign forces within its territory during peacetime, crisis or emergencies, or war based upon agreements mutually concluded between nations. (Joint Pub 1-02)

Joint Force. A general term applied to a force composed of significant elements, assigned or attached, of two or more Military Departments, operating under a single commander authorized to exercise operational control joint force commander. (Joint Pub 1-02)

Joint Force Commander. A general term applied to a combatant commander, sub-unified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force. Also called JFC. (Joint Pub 1-02)

Medical Treatment Facility. A facility established for the purpose of furnishing medical and/or dental care to eligible individuals. Also called MTF. (Joint Pub 1-02)